

REMARKS

Claims 5, 7 and 8 are pending in this application.

The Examiner has maintained the rejection of claims 5, 7 and 8 under 35 U.S.C. § 103(a) as being unpatentable over Parson et al. (US 6,440,359) (“US’359”) in view of Ohyama et al. (US 6,355,090) (“US’090”). Applicants respectfully traverse the rejection.

The Examiner has once again failed to address and comment on the features of vital importance that distinguish the claimed invention over the cited references. Thus, the Examiner has totally overlooked and has failed to comment on the feature in claim 5 that “the aluminum alloy includes AlMnFeSi dispersoid particles which are formed during homogenisation and which act as nucleation sites for [a large number of small] Mg₂Si particles during cooling after homogenisation”.

Claim 5 is directed to an aluminum alloy with very narrow ranges of the most important alloying elements, i.e. Mg, Si and Mn. Thus, the claimed alloy is the selection type.

The Mg₂Si particle sizes in the billet depend on various factors, such as the Mg and Si content of the alloy, the cooling rate after homogenisation, and the nucleation conditions for Mg₂Si particles. The Mg and Si in these defined narrow ranges (i.e., 0.35-0.5 wt% and 0.35-0.6 wt%, respectively) are added to give the necessary strength to the material in the final ageing treatment of the extruded profiles.

As discussed in the previous response, an Mn level of up to 0.03 wt% is commonly applied to achieve a high degree of transformation from β -AlFeSi to α -AlFeSi. However, Applicants have found that exceeding this amount of Mn (up to 0.06 wt%) provides a benefit to the productivity in the extrusion press. However, if more than 0.06 wt% of Mn is added to the alloys, then there is a negative effect on the quench sensitivity of the extruded profile. Accordingly, claim 5 clearly defines the amount of Mn to be “0.03 – 0.06” wt%. This is a critical range that provides unexpected results over the art (see MPEP 2144.05 III).

This selective alloy composition, having these very narrowly defined alloy element ranges, forms AlMnFeSi dispersoid particles during homogenisation, and provides a large number of small Mg₂Si particles during cooling after homogenisation, as recited in claim 5. This results in the reduction in the size of large Mg₂Si particles that form on grain boundaries and dendrite arm boundaries. The reduction in size of these large Mg₂Si particles represents the

fundamental working principles of the claimed invention, and is completely unexpected over the art.

The cited references do not disclose or suggest this selective alloy composition in combination with homogenisation and the selective cooling, which enable the formation of a large number of small Mg_2Si particles and the reduction in the size of large Mg_2Si particles.

The Examiner states that “the property of higher Mn content (0.03-0.06wt% Mn) reduces the number coarse Mg_2Si particles in the billets after homogenization is not include[d] in the limitation of the instant claims” (see page 3, lines 17-19). Applicants respectfully disagree.

As stated above, the narrow ranges of Mn (0.03-0.06 wt%), as well as the homogenisation and cooling, must be selected such that the AlMnFeSi dispersoid particles are created, which thereafter forms a large number of small Mg_2Si particles. Moreover, claim 5 clearly recites “Mn 0.03 – 0.06” and “wherein the alloy includes AlMnFeSi dispersoid particles which are formed during homogenisation and which act as nucleation sites for Mg_2Si particles during cooling after homogenisation”.

US ‘359 has a very wide range of Mn (0.002 - 0.15 wt%), and provides no teaching or suggestion regarding the selection of homogenisation and cooling temperatures in order to obtain the dispersoid particles and a resulting large number of small Mg_2Si particles. In addition, the reference teaches away from the claimed invention in that it teaches to include an amount of Mg that is lower than claim 5 (i.e., 0.20-0.34 wt% for US’359 versus 0.35-0.5 wt% in claim 5). As previously stated, such low Mg content reduces the strength of the alloy and makes it unstable and less consistent in term of strength quality. Further, the low Mg content impacts the formation of the dispersoid particles, as mentioned above.

The Examiner has asserted that “[t]he major composition ranges disclosed by US’090...overlap the composition ranges of the instant invention”, and “[t]here is no support for the argument that US’090 is a completely different alloy” (see page 4, lines 11-18). However, the Examiner has failed to consider the fact that claim 1 of US’090 specifies Si in the amount of 2.5-4.0 wt%, which is far outside (i.e., 10 times) the range of Si of 0.35-0.6 wt% recited in claim 5. Accordingly, the Examiner has failed to recognize that the alloy of US’090 is totally different from the alloy of claim 5.

Therefore, claim 5 would not have been obvious over the references.

Claims 7 and 8 depend directly from claim 5, and thus also would not have been obvious over the references.

For these reasons, Applicants take the position that the presently claimed invention is clearly patentable over the applied references.

Therefore, in view of the foregoing remarks, it is submitted that the rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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